United States
Department of
Agriculture

Soil
Conservation
Service

Raleigh
North Carolina

Erosion and the Falls of the Neuse Reservoir

A Summary of the Upper Neuse River Erosion Study

Introduction

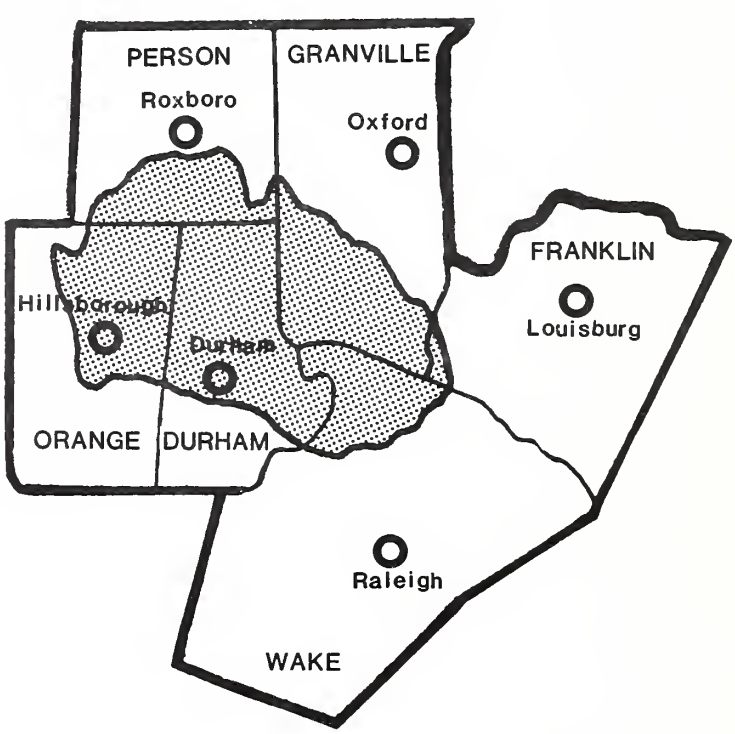
asts, the Falls of the Neuse Reservoir can enjoyment. It can also provide all the s the Triangle Region continues to grow, nportant water resource. However, as the 96 acre Upper Neuse River Basin drainage how activities in the Basin will affect the nicipal discharges upstream and runoff n degrade the water quality of the reservoir.

from both a water quality standpoint and nost severely eroded areas in North s significant amounts of sediment to the the reservoirs water capacity, it also into the reservoir. Increased nutrients levels, especially phosphorus, can result in excessive growth of nuisance algae which will limit the lake's recreational usage.

Several state and federal agencies, with land and water resource management responsibilities, are identifying the extent of the problems. This information can be used by concerned governments to identify needed actions.

In order to address the erosion and resulting sedimentation problem, the USDA, Soil Conservation Service was requested to conduct an erosion study in the Upper Neuse Basin. This report summarizes the findings and recommendations of the groups involved in the study.

Upper Neuse River Basin



Basin Activity

Land use in the Basin is a mixture of forest agriculture, urban, and industrial activity. Therefore, the economy is dependent on a variety of enterprises which rely on land and water resources in the area.

Land Use in the Basin

Land	Acres	Percent Total Area
Cropland	60,644	12
Pasture and Hayland	35,787	7
Idle Cropland	8,953	2
Urban/Residential	50,987	10
Large Lakes	23,367	5
Forestland	304,369	62
Other*	9,089	2
	493,196	100

***Includes rural residences, farmsteads, small bodies of water, roadsides, streambanks, construciton sites, etc.**

The Problem-Erosion

As a land resource study, the Upper Neuse River Erosion Study places emphasis on present land conditions and how erosion will affect land conditions in the future. Emphasis is placed on cropland erosion because the long-term success of agriculture depends on productive soil. Erosion's harm is not limited to the land, but also to the waters that receive the runoff and sediment.

Erosion results when unprotected land is exposed to wind and rain. The most common type of erosion caused by water is sheet erosion. Thin layers or "sheets" of soil are washed uniformly from the entire field's surface. During any single storm this action is hard to see, yet over a year's time these thin layers add up to many tons. Because of the almost invisibility of sheet erosion, many landowners feel their land is not being damaged by erosion.

On more erosive fields, or where there has already been considerable sheet erosion occuring, small gullies or rills will appear. Any field that is experiencing rill erosion is probably already damaged to the point of hurting productivity.

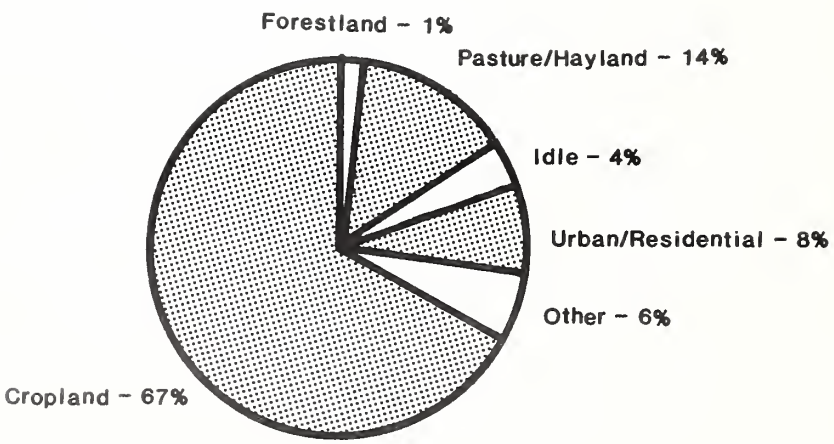
Gullies form where large volumes of water collect. A gully left untreated can destroy entire fields or at minimum damage farm equipment.

Cropland, which in only 12 percent of the river basin land, has 67% of the erosion. Looking at cropland only, 26% of the cropland has 45% of the erosion. However, almost all cropland within the basin is eroding at rates higher than acceptable.

Though having less erosion, other land types can also be big contributors to sediment. Almost all streambank erosion ends up in the stream, and often large portions of erosion from unprotected construction sites enter waterways.

Cropland accounts for 67% of the erosion occuring in the Basin. Almost 600,000 tons of soil erodes annually on cropland. Erosion exceeds acceptable limits on over 51,000 acres of cropland.

Sources of Erosion



Effects of Erosion

Productivity of the soil is based on the quality, or depth of topsoil. The greater the topsoil's depth, the higher the crop yields. When topsoil erodes, a farmer must add additional commercial fertilizer to maintain yields which increases production costs. Eventually, if erosion continues to occur, not even the addition of fertilizer will maintain yields.

Over the next few decades, at present erosion rates, enough soil would have eroded to affect the yield potential of every acre of cropland in the Basin. In other words, 98 percent of the land will have eroded to the point where crop production will decline.

Loss of Productive Land

Depth of Topsoil	Productivity	Present Cropland/ Acres	Percent	Acres by 2006	Percent
6 inches	Best	1,095	2	0	0
3 to 6 inches	Fair	55,251	91	1,095	2
3 inches	Poor	4,298	7	59,549	98
					100

Severe cropland erosion reduces the land's ability to produce. About 25% of the cropland acres in the Basin are eroding in excess of 12 tons per acre per year. The resulting sediment, when deposited in a field, destroys the crop. Future yields decline as valuable topsoil erodes.

Erosion and the resulting sediment are not limited to cropland. Any land exposed to the forces of wind and rain will erode. Construction sites are good examples of disturbed land which has a high potential for erosion.

Yield Losses Due to Erosion (Loss of 1.5 inches)

Tobacco	**Reduce yields by 11%**
Corn	**Reduce yields by 15.6%**
Soybeans	**Reduce yields by 22%**
Small Grain	**Reduce yields by 10.5%**

Sediment, and end product of soil erosion, is by volume the largest water pollutant in North Carolina. More than 250,000 tons of sediment enters the Fall Reservoir each year, reducing its capacity to store water for flood control and water supply. Water treatment costs will increase and fish population will decline as spawning beds are covered and organisms vital to the food chain are destroyed. We reduce sedimentation problems by reducing erosion.

Nutrient Enrichment, or an overload of nutrients like nitrogen and phosphorus, is a major water quality concern in the lake. With the right temperature and light conditions, these nutrients (especially phosphorus) can stimulate the over-production and accumulation of millions of minute aquatic plants called algae. When a nuisance algal bloom occurs, such as with the blue-green species, a thick algal soup halts all forms of recreation. Blue-green algae robs oxygen from fish when it decays and crowds out beneficial species. Algal blooms can create taste and odor problems and make more expensive water treatment necessary. Phosphorus and other agricultural chemicals are transported to the reservoir with sediment. Controlling erosion therefore helps control nutrient enrichment.

When sediment levels are high, several water quality problems occur. In addition to the visible aesthetic problems, sediment clogs stream channels and can reduce fish populations. Sediment also transports other pollutants such as nutrients and pesticides.

The Answer - Resource Mangagement Systems

Controlling cropland erosion and runoff can be accomplished through the application of sound soil conservation and farm managment practices known as Best Management Practices (BMP's). BMP's include such practices as conservation tillage, contour farming, stripcropping, field borders, grassed waterways, soil testing, fertilizer management and animal waste management. BMP's are more effective when used in combination allowing them to provide total erosion and runoff protection. These are referred to as resource mangement systems. The use of these systems can reduce erosion, improve farm management, improve water quality, increase yields and lower farm operating costs.

A number of proven, soil conservation practices can be applied to cropland which will reduce erosion. Conservation tillage, grassed waterways, strip-cropping are a few of the practices which, in combination, are referred to as Resource Management Systems.

Action

Controlling erosion on cropland is a difficult and expensive task. Through education, technical assistance and economic incentives, farmers are encouraged to install resource management systems. Landowners seek voluntarily these services offered by the USDA, Soil Conservation Service, Soil and Water Conservation Districts, and the Agricultural Extension Service. If present levels of operation are maintained projected over the next ten years, erosion will be reduced by only 6 percent. If significant reductions in erosion are to occur, additional resources are needed.

Results of 3 Levels of Implementation

Action	Total Cost	Acres Treated	Remaining Acres Needing Treatment	Erosion Reduction (Tons)	Sediment Reduction (Tons)
1. Contribution of ongoing program	$2,632,532	16,500	41,728	96,526	15,990
2. Treat all critical areas	$5,302,117	28,583	29,645	215,633	44,575
3. Treat all acres needing treatment.	$12,412,486	58,228	0	330,226	72,075

Conclusion

Though soil erosion is not the only contributor to the declining water quality of the Neuse River Basin, it is a significant factor. But reduced water quality is only one aspect of soil erosion. Reduced yields and the corresponding economic decline of the agricultural community must also be clearly understood.

The Upper Neuse River Basin Erosion Study, which this publication is a summary of, only identifies the problems. It will take all the concern groups working cooperatively to bring effective action about. Tackling the problem of erosion and sediment control in a river basin of nearly 500,000 acres is a difficult task. There are solutions, well proven. There are agencies and organizations in existence to implement needed action. What is lacking now is the commitment.